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B3B  
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(54) Chuck adaptor

(57) A machine tool adaptor enabling machine tools designed to accept machine tool bits having plain cylindrical shanks to accept instead machine tool bits having whistle notch or weldon flat shanks, including means 13, 14 to adjust the axial position of such machine tool bits within the adaptor prior to selection and insertion in the machine. In one embodiment the adaptor is provided with a suitable circumferential flange for co-operation with automatic flange tool change equipment.

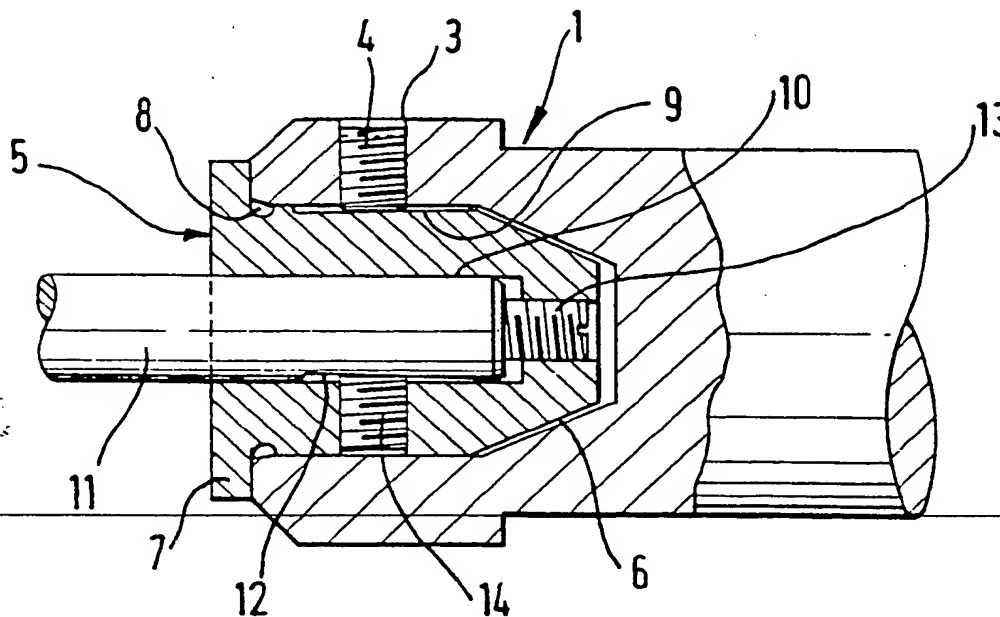


Fig.2.

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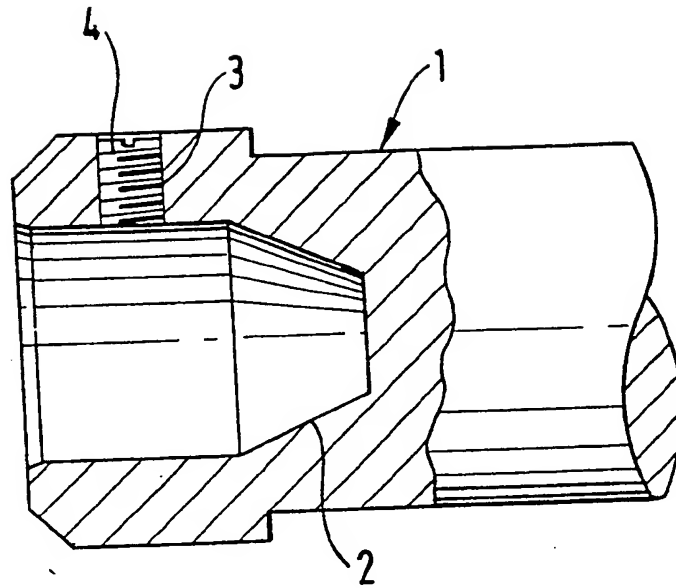


Fig.1.

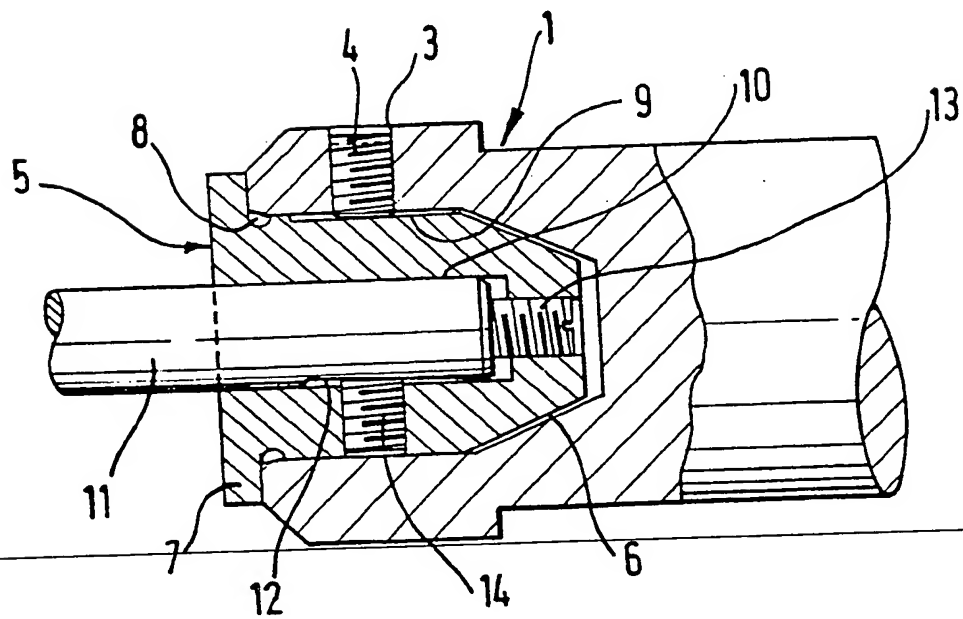


Fig.2.

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Fig.3.

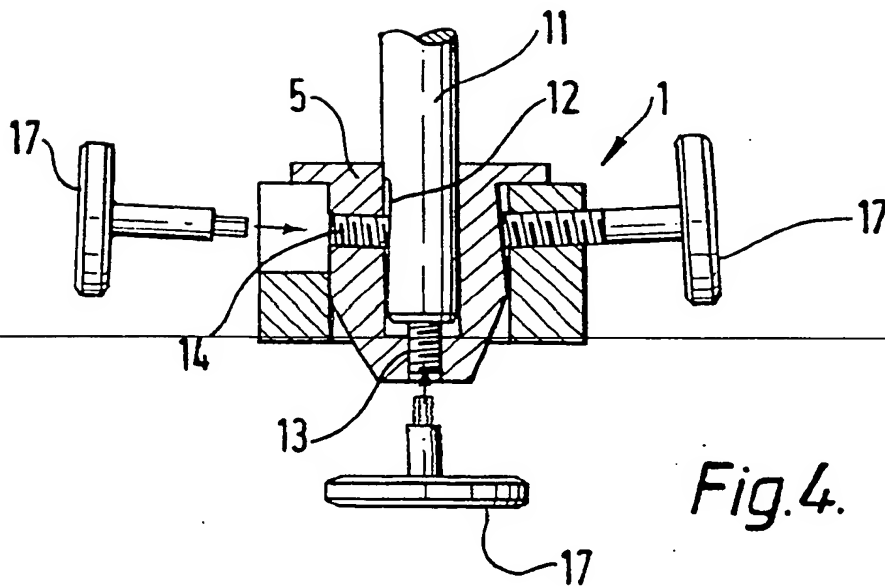
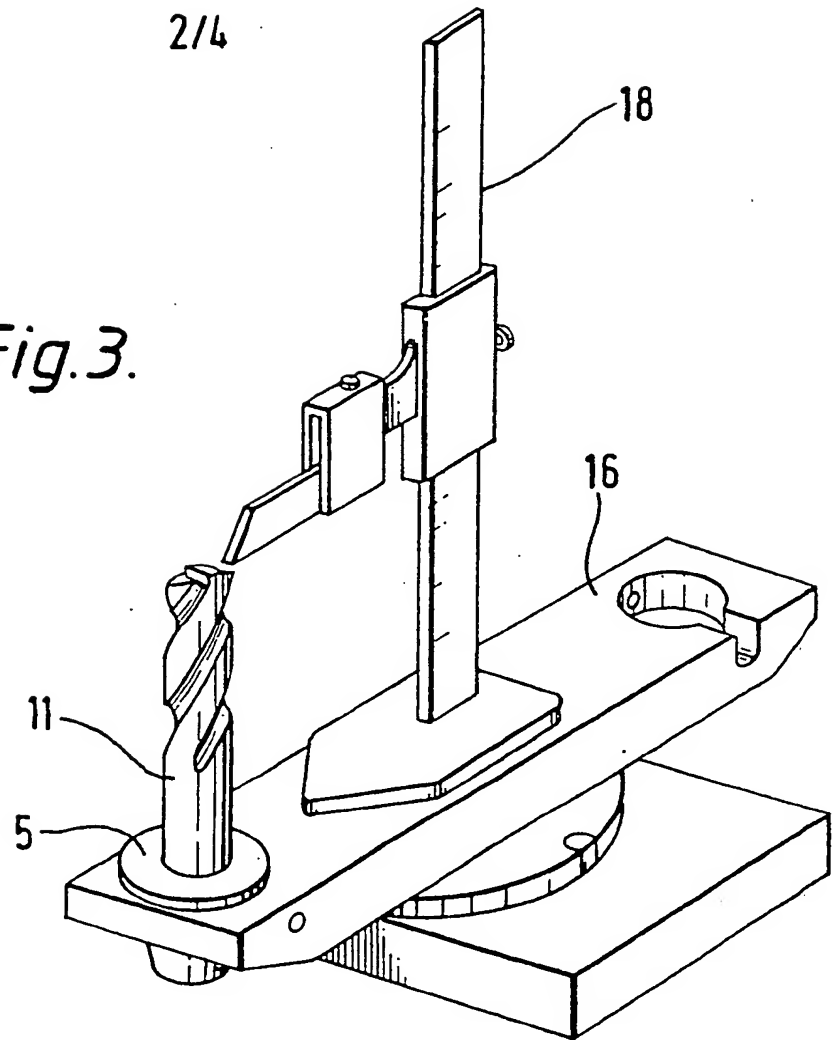
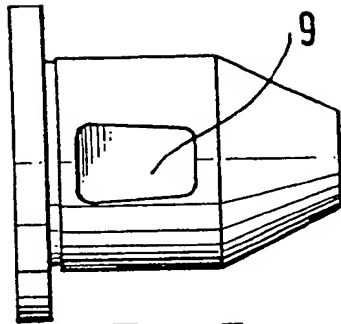
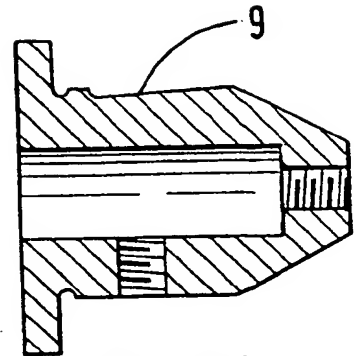


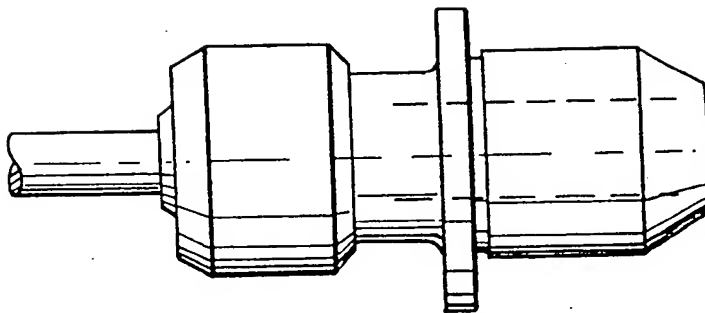
Fig.4.



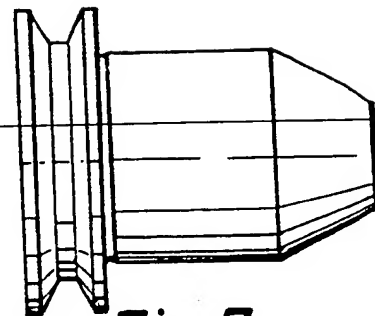
*Fig. 5a.*



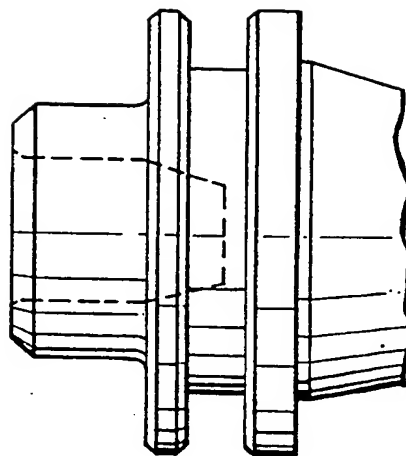
*Fig. 5b.*



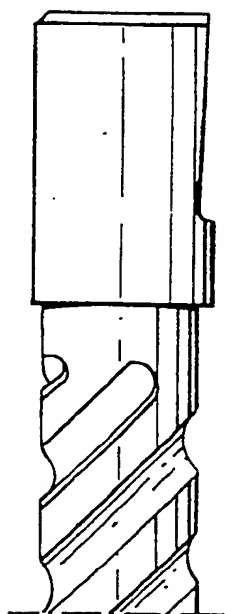
*Fig. 6.*



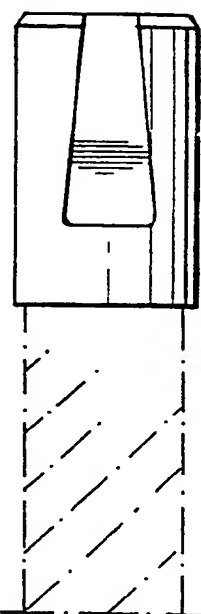
*Fig. 7.*



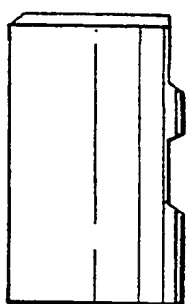
*Fig. 8.*



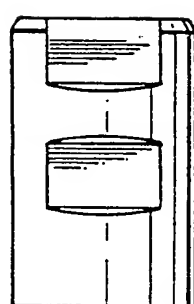
*Fig. 9a.*



*Fig. 9b.*



*Fig. 10a.*



*Fig. 10b.*

MACHINE TOOL ADAPTOR

This invention relates to adaptors for enabling the shank of a machine tool bit to be fitted into the cavity of a machine tool chuck.

Some recently developed computer numerically controlled machines with off-axis milling drilling facilities use a specially tapered collet chuck to secure the plain cylindrical shank of a machine tool bit into a detachable geared-drive tool holder. It is sometimes desirable to use machine tool bits of a different design, however, if a shank is designed to a different standard it is not always possible; for instance two standard configurations of shank known as the whistle notch and weldon flat shank are not compatible with a tapered collet chuck. It is usually necessary for the user to have a large number of specialised tool chucks for different bits which increases the expense of tooling.

It is an object of this invention to provide an adaptor for tapered collet chucks which accepts machine tool bits which have shanks configured in the weldon flat or whistle stop standard.

Advantages of the invention are that it is:-

- 1 Capable of incorporation in a variety of proprietary geared toolholders, spindle chucks and small machine tools generally;
- 2 Enables end users to employ common tooling on both lathes and machining centres;
- 3 Milling cutters fully compensated for off-centre effect of Whistle-notch or Weldon Flat designs;
- 4 Can accommodate other workheads;
- 5 Simple and reliable pre-setting of tools using an inexpensive bench tool with common measurement tools;



- 6 Hazards from tool collisions reduced - adaptors are inexpensive and readily replaced. Even without full factory facilities, users could make temporary replacements if necessary;
- 7 Tools positively located and held;
- 8 Cash savings in provisioning tool preparation systems.

According to one aspect of this invention there is provided an adaptor for fixing inside the cavity of a machine tool chuck said adaptor comprising a block of material shaped to lie within the interior of the machine tool chuck with a central bore for receiving the shank of a machine tool bit and with adjustable means for positioning and fixing said machine tool bit axially within the bore of the adaptor and with further means for fixing the adaptor into said machine tool chuck.

A specific example of the invention will now be described by way of example in which:-

Figure 1 is a partial section view of the end of a machine drive showing the conical sectional shape of the chuck.

Figure 2 is a section view of the chuck of Figure 1 showing the adaptor in position inside the chuck of a machine tool workhead;

Figure 3 is a schematic diagram of a device for setting a tool bit inside the adaptor and

Figure 4 is a section view of the adaptor of figure 3.

Figure 5 is a top view of the adaptor showing the position of a flat in its surface;

Figure 6 illustrates the adaptor with a typical proprietary device mounted upon it. This could be a drill chuck or even a "floating" head for close-tolerance reaming applications, or a specialized thread tapping device;

Figures 7 and 8 shows a flange adaptation with typical features for automatic toolchanging equipment.

Figures 9a to 10b show whistle stop and weldon flat configurations respectively on the shank of a tool bit.

Referring to Figure 1 the machine tool comprises a machine tool chuck 1 which has a conical chuck cavity 2. The cavity is shown as empty but would usually receive the shaft of a tool bit and a conical collet. The chuck 1 has a threaded bore 3 which contains a grub screw 4 which can be screwed into the cavity 2 of the chuck. Figure 2 shows the same chuck as Figure 1 but with an adaptor 5 inside the cavity 2. The adaptor 5 has a tapered end 6 which fits into the conical cavity 2 of the chuck and a flange 7 at its other end. The adaptor also has an underhead radius 8 machined around its circumference immediately behind the flange 7. The underhead radius reduces stress, in the region where the adaptor would otherwise make contact with the chuck, and reduces damage between the chuck and adaptor. A flat surface 9 is machined into the side of the adaptor and the adaptor also has a cylindrical bore 10 in its middle for receiving the shaft of tool bit 11. The shaft 11 of the tool bit has a flat surface 12 machined into it, this is shown as a whistle stop notch but could be a weldon flat. Grub screws 13 and 14 are used to adjust and set the position of the tool bit in the chuck and grub screw 4 is used to secure the adaptor in the machine tool chuck.

Figures 3 and 4 show how a tool bit is set in the adaptor. The adaptor 5 is placed into a hole in platform 16 of a presetting tool and the shank of a tool bit 11 is placed into the bore 10 of the adaptor. Initially the shank 11 of the tool bit is free to slide axially within the bore 10. Shank 11 rests against grub screw 13 by

its end and when grub screw 13 is screwed into or out of the bore 10, using a hexagonal key 17, the axial position of the tool bit is adjusted within the bore. The amount by which the tool bit has been adjusted is measured off a scale 18. When the required tool set has been achieved the tool bit is secured in place by tightening grub screw 14. The grub screw 14 makes contact with the flat whistle notch stop 12 on the shank 11 of the tool bit and prevents longitudinal and rotational movement of the bit within the adaptor. When the tool has been set in the adaptor the adaptor and tool bit is placed in the machine tool chuck in place of a tapered collet and is fastened in place by grub screw 4. Grub screw 4 is tightened against a flat face 9 of the adaptor until the adaptor is firmly held in place inside the machine tool chuck.

The face 9 machined on one side of the adaptor may be in the form of a whistle stop or weldon flat. Figures 5a and 5b show the flat surface 9 machined into one side of the adaptor for the grub screw 4 to press against.

Because the tool bit can be set within the chuck it is possible to adjust the bit to compensate for differences in length of each bit after regrinding etc. The adaptor and tool bit are also less likely to slip within the chuck when the tool bit is under a load than the tapered collet arrangement in which the tool bit shank is secured by friction. Grub screw 14 prevents the tool bit from rotating inside the adapter and grub screw 13 prevents the tool bit from being pushed back into the adaptor, laterally along shaft 10, when the bit is under a load. The adaptor reduces the need for the machine tool user to keep a large number of specialised chucks for each different type of tool bit and also enables automatic tool changing to be achieved without the need for bulky and expensive through spindle drawbars.

Figures 7 and 8 show adaptors which have been modified, by the addition of another flange, for automatic tool changing.

CLAIM

1      An adaptor for fixing inside the cavity of a machine tool chuck said adaptor comprising a block of material shaped to lie within the interior of the machine tool chuck with a central bore for receiving the shank of a machine tool bit and with adjustable means for positioning and fixing said machine tool bit axially within the bore of the adaptor and with further means for fixing the adaptor into said machine tool chuck.

The preceding claim has been superceded by the following claims:-

CLAIMS

- 1 An adaptor for fixing inside the cavity of a machine tool chuck said adaptor comprising a block of material shaped to lie within the interior of the machine tool chuck with a central bore for receiving the shank of a machine tool bit and with adjustable means for positioning and fixing said machine tool bit axially within the bore of the adaptor and with further means for fixing the adaptor into said machine tool chuck.
2. An adaptor as claimed in Claim 1 and wherein the external shape of the adaptor matches the internal shape of a tapered collet chuck and the shape of the cylindrical bore of the adaptor is cylindrical and dimensioned to accept whole notch or weldon flat tool bit shanks.
3. An adaptor as claimed in Claim 1 or Claim 2 and wherein the adjustable means comprises a first grub screw positioned for axial movement within a threaded end portion of said central bore, and a second grub screw positioned for movement and within a threaded portion orthogonal to said central bore.
4. An adaptor as claimed in any preceding claim and further including a circumferential flange adapted for co-operation with an automatic tool change mechanism.
5. An adaptor substantially as hereinbefore described and with reference to all the Figures of the accompanying drawings.

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